

User Guide for the GREET Fleet Footprint Calculator 1.0

Background

Beginning in 1998, the Department of Energy's (DOE's) Clean Cities Program enlisted expertise at Argonne National Laboratory (Argonne) to develop a U.S. Environmental Protection Agency co-sponsored tool to assist metropolitan areas and Clean Cities coalitions in estimating criteria air pollutant reductions achieved by near-term introduction of alternative-fueled vehicles. Known as AirCRED, the tool was designed to be used by stakeholders of DOE's Clean Cities program to assist state and regional air quality officials with developing ozone precursor and carbon monoxide emission reduction strategies for use in State Implementation Plans.

Now in accordance with the desire to measure the petroleum displacement and greenhouse gas (GHG) emissions of medium- and heavy-duty vehicles and off-road equipment, Argonne has developed the GREET Fleet Footprint Calculator (Version 1.0) for Clean Cities stakeholders to estimate these values using simple spreadsheet inputs. The basis of this calculator is Argonne's **Greenhouse gases, Regulated Emissions, and Energy use in Transportation (GREET)** fuel-cycle model which is used to generate necessary petroleum use and GHG emission co-efficients of key fuel production pathways and combustion fuel types.

Fleet managers can quickly insert their data to generate petroleum use and GHG emissions on a well-to-wheels (WTW) basis. A WTW analysis can be divided into two stages: well-to-pump (WTP) and pump-to-wheels (PTW). The WTP stage starts with the fuel feedstock recovery, followed by fuel production, and ends with the fuel available at the pump, while the PTW stage represents the vehicle's operation activities. It is important to examine transportation fuels and technologies on a WTW basis in order to properly compare alternatives, as activities upstream of vehicle operation can use significant amounts of energy and subsequently produce a large amount of emissions.

A Brief Description of GREET Fleet

There are three Microsoft Excel sheets in the calculator, which will be explained below.

On-Road Fleet sheet

The user first decides whether to calculate their WTW petroleum use and GHG emissions by either entering the fleet size, vehicle miles traveled (VMT), and fuel economy (Option 1) or entering fuel use (Option 2).

On-Road Fleet sheet - Table 1

1. Method to Calculate On-Road Fleet's Petroleum Energy Use and GHG Footprint

1	1 - Fleet size, vehicle miles traveled, and fuel economy
	2 - Fuel use (skip to question 5)

A user who is trying to compare different fuels/technologies in consideration of future purchases may want to choose Option 1. This way the user can create an estimate depending on how many

vehicles that are planned for purchase, how many miles the vehicles will be driven and the vehicle's fuel economy in miles per gasoline gallon equivalent (see Tables 2-4). Argonne has entered default data for VMT and fuel economy but it is highly recommended that users enter their own data.

On-Road Fleet sheet - Tables 2 through 4

2. The Number of Each Type of Vehicle in On-Road Fleet

	Gasoline	Diesel	Diesel HEV	Biodiesel (B20)	Biodiesel (B100)	Ethanol (E85)	Compressed Natural Gas (CNG)	Liquidified Natural Gas (LNG)	Landfill Gas (LFG)	Liquidified Petroleum Gas/ Propane (LPG)	Electricity	Gaseous Hydrogen (G.H2)	Liquid Hydrogen (L.H2)
School Bus	0	0	0	0	0	0	0	0	0	0	0	0	0
Transit Bus	0	0	0	0	0	0	0	0	0	0	0	0	0
Shuttle/Paratransit Bus	0	0	0	0	0	0	0	0	0	0	0	0	0
Waste Hauler	0	0	0	0	0	0	0	0	0	0	0	0	0
Street Sweeper	0	0	0	0	0	0	0	0	0	0	0	0	0
Delivery Step Van	0	0	0	0	0	0	0	0	0	0	0	0	0
Transport/Freight Truck	0	0	0	0	0	0	0	0	0	0	0	0	0
Medium/Heavy Duty Pickup Truck	0	0	0	0	0	0	0	0	0	0	0	0	0
Maintenance Utility Vehicle	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0	0

3. The Average Annual Vehicle Miles Traveled by Each Vehicle Type

	Gasoline	Diesel	Diesel HEV	B20	B100	E85	CNG	LNG	LFG	LPG	Electricity	G.H2	L.H2
School Bus	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000
Transit Bus	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000
Shuttle/Paratransit Bus	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000
Waste Hauler	23,400	23,400	23,400	23,400	23,400	23,400	23,400	23,400	23,400	23,400	23,400	23,400	23,400
Street Sweeper	12,600	12,600	12,600	12,600	12,600	12,600	12,600	12,600	12,600	12,600	12,600	12,600	12,600
Delivery Step Van	16,500	16,500	16,500	16,500	16,500	16,500	16,500	16,500	16,500	16,500	16,500	16,500	16,500
Transport/Freight Truck	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000
Medium/Heavy Duty Pickup Truck	11,400	11,400	11,400	11,400	11,400	11,400	11,400	11,400	11,400	11,400	11,400	11,400	11,400
Maintenance Utility Vehicle	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000
Other	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000

4. The Average Fuel Economy for Each Vehicle Type in the On-Road Fleet (miles per gasoline gallon equivalent)

	Gasoline	Diesel	Diesel HEV	B20	B100	E85	CNG	LNG	LFG	LPG	Electricity	G.H2	L.H2
School Bus	6.0	7.0	8.5	7.0	7.0	6.0	6.0	6.0	6.0	6.0	20.5	12.0	12.0
Transit Bus	2.5	3.0	3.8	3.0	3.0	2.5	2.5	2.5	2.5	2.5	8.5	5.0	5.0
Shuttle/Paratransit Bus	7.0	8.0	10.0	8.0	8.0	7.0	7.0	7.0	7.0	7.0	24.0	14.0	14.0
Waste Hauler	2.0	2.5	3.0	2.5	2.5	2.0	2.0	2.0	2.0	2.0	7.0	4.0	4.0
Street Sweeper	3.0	4.0	5.0	4.0	4.0	3.0	3.0	3.0	3.0	3.0	10.0	6.0	6.0
Delivery Step Van	12.0	15.0	18.5	15.0	15.0	12.0	12.0	12.0	12.0	12.0	41.0	24.0	24.0
Transport/Freight Truck	5.0	6.0	7.5	6.0	6.0	5.0	5.0	5.0	5.0	5.0	17.0	10.0	10.0
Medium/Heavy Duty Pickup Truck	9.0	11.0	13.5	11.0	11.0	9.0	9.0	9.0	9.0	9.0	31.0	18.0	18.0
Maintenance Utility Vehicle	20.0	25.0	31.0	25.0	25.0	20.0	20.0	20.0	20.0	20.0	68.0	40.0	40.0
Other	2.5	3.0	3.8	3.0	3.0	2.5	2.5	2.5	2.5	2.5	8.5	5.0	5.0

A user who is trying to calculate an existing fleet's petroleum and carbon footprint may want to choose Option 2 and will skip to Table 5. The user will likely know the amount of fuel used and can quickly enter that information (in gallons, cubic feet, or kilowatt hours of the specific fuel). After the user inputs the fuel use, the gasoline gallon equivalent for each fuel will be displayed below the table.

On-Road Fleet sheet - Table 5

5. The Annual Total Fuel Use by On-Road Fleet Vehicles (gallons, cubic feet, or kilowatt-hours)

	Gasoline (gallons)	Diesel (gallons)	Diesel HEV (gallons)	B20 (gallons)	B100 (gallons)	E85 (gallons)	CNG (cubic feet)	LNG (gallons)	LFG (cubic feet)	LPG (gallons)	Electricity (kilowatt- hours)	G.H2 (cubic feet)	L.H2 (gallons)
School Bus	0	0	0	0	0	0	0	0	0	0	0	0	0
Transit Bus	0	0	0	0	0	0	0	0	0	0	0	0	0
Shuttle/Paratransit Bus	0	0	0	0	0	0	0	0	0	0	0	0	0
Waste Hauler	0	0	0	0	0	0	0	0	0	0	0	0	0
Street Sweeper	0	0	0	0	0	0	0	0	0	0	0	0	0
Delivery Step Van	0	0	0	0	0	0	0	0	0	0	0	0	0
Transport/Drayage/Freight Truck	0	0	0	0	0	0	0	0	0	0	0	0	0
Medium/Heavy Duty Pickup Truck	0	0	0	0	0	0	0	0	0	0	0	0	0
Maintenance Utility Vehicle	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0	0
Gasoline Gallon Equivalent Total	0	0	0	0	0	0	0	0	0	0	0	0	0

The fuel production assumptions allow the user to customize the simulation. For instance, a user can compare their footprint of ethanol vehicles using either corn (Option 1) or cellulosic (Option

2) feedstocks. A user who wants to enter a custom electricity generation mix will need to go to the Table 4 of the Specs sheet and enter it there (see Specs sheet description below).

On-Road Fleet sheet - Table 6

6. Fuel Production Assumptions

Ethanol Feedstock Source	1	1 - Corn 2 - Switchgrass
CNG Feedstock Source	1	1 - North American NG 2 - Non-North American NG
LNG Feedstock Source	1	1 - North American NG 2 - Non-North American NG
LPG Feedstock Source	NG 60%	Petroleum 40%
Source of Electricity for On-Road Electric Vehicles and H2 Electrolysis		
	1	1 - Average U.S. Mix 2 - Average Northeast Mix 3 - Average California Mix 4 - User Defined (go to 'Specs' sheet)
G.H2 Production Process	1	1 - Refueling Station SMR (On-site) 2 - Central Plant SMR (Off-site) 3 - Refueling Station Electrolysis (On-site)
L.H2 Production Process	1	1 - Refueling Station SMR (On-site) 2 - Central Plant SMR (Off-site) 3 - Refueling Station Electrolysis (On-site)

The results for petroleum usage are shown in barrels of oil, while those for GHG emissions are shown in carbon dioxide (CO₂)-equivalent short tons. A short ton is equivalent to 2000 pounds.

On-Road Fleet sheet - Table 7-8

7. Results of On-Road Fleet's Petroleum Usage (barrels)

	Gasoline	Diesel	Diesel HEV	B20	B100	E85	CNG	LNG	LPG	LPG	Electricity	G.H2	L.H2	Vehicle Total
School Bus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Transit Bus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shuttle/Paratransit Bus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Waste Hauler	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Street Sweeper	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delivery Step Van	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Transport/Freight Truck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Medium/Heavy Duty Pickup Truck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maintenance Utility Vehicle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

On-Road Fleet Total 0.0 barrels of oil

8. Results of On-Road Fleet's Greenhouse Gas Emissions (short tons CO₂-equivalent)

	Gasoline	Diesel	Diesel HEV	B20	B100	E85	CNG	LNG	LPG	LPG	Electricity	G.H2	L.H2	Vehicle Total
School Bus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Transit Bus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shuttle/Paratransit Bus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Waste Hauler	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Street Sweeper	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delivery Step Van	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Transport/Freight Truck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Medium/Heavy Duty Pickup Truck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maintenance Utility Vehicle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

On-Road Fleet Total 0.0 tons of GHG emissions

Off-Road Fleet sheet

The flow of this sheet is the same as the On-Road Fleet sheet; however for Option 1, the user will input fleet size, the hourly usage, and brake horsepower of each piece of equipment.

Off-Road Fleet sheet - Table 1

1. Method to Calculate Off-Road Fleet's Petroleum Energy Use and GHG Footprint

1

1 - Fleet size, annual hourly usage, and brake horse power
2 - Fuel use (skip to question 5)

Off-Road Fleet sheet - Table 2-4

2. The Number of Each Type of Equipment in Off-Road Fleet

	Gasoline	Diesel	Diesel HEV	Biodiesel (B20)	Biodiesel (B100)	Ethanol (E85)	Compressed Natural Gas (CNG)	Liquidified Natural Gas (LNG)	Landfill Gas (LFG)	Liquidified Petroleum Gas/ Propane (LPG)	Electricity	Gaseous Hydrogen (G.H2)	Liquid Hydrogen (L.H2)
Forklift	0	0	0	0	0	0	0	0	0	0	0	0	0
Skid Loader	0	0	0	0	0	0	0	0	0	0	0	0	0
Front-end Loader	0	0	0	0	0	0	0	0	0	0	0	0	0
Crane	0	0	0	0	0	0	0	0	0	0	0	0	0
Backhoe/Loader	0	0	0	0	0	0	0	0	0	0	0	0	0
Excavator	0	0	0	0	0	0	0	0	0	0	0	0	0
Bulldozer	0	0	0	0	0	0	0	0	0	0	0	0	0
Asphalt Paver	0	0	0	0	0	0	0	0	0	0	0	0	0
Asphalt Roller	0	0	0	0	0	0	0	0	0	0	0	0	0
Compactor	0	0	0	0	0	0	0	0	0	0	0	0	0
Woodchipper/Spreader	0	0	0	0	0	0	0	0	0	0	0	0	0
Grader/Maintainer	0	0	0	0	0	0	0	0	0	0	0	0	0
Landfill Tipper	0	0	0	0	0	0	0	0	0	0	0	0	0
Catch Basin Cleaner	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydraulic Concrete Breaker	0	0	0	0	0	0	0	0	0	0	0	0	0
Concrete Mixer	0	0	0	0	0	0	0	0	0	0	0	0	0
Air Compressor	0	0	0	0	0	0	0	0	0	0	0	0	0
Other 1	0	0	0	0	0	0	0	0	0	0	0	0	0
Other 2	0	0	0	0	0	0	0	0	0	0	0	0	0
Other 3	0	0	0	0	0	0	0	0	0	0	0	0	0
Other 4	0	0	0	0	0	0	0	0	0	0	0	0	0
Other 5	0	0	0	0	0	0	0	0	0	0	0	0	0

3. The Average Annual Hourly Usage by Each Equipment Type

	Gasoline	Diesel	Diesel HEV	B20	B100	E85	CNG	LNG	LFG	LPG	Electricity	G.H2	L.H2
Forklift	230	230	230	230	230	230	230	230	230	230	230	230	230
Skid Loader	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700
Front-end Loader	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400
Crane	160	160	160	160	160	160	160	160	160	160	160	160	160
Backhoe/Loader	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Excavator	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900
Bulldozer	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300
Asphalt Paver	100	100	100	100	100	100	100	100	100	100	100	100	100
Asphalt Roller	770	770	770	770	770	770	770	770	770	770	770	770	770
Compactor	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Woodchipper/Spreader	500	500	500	500	500	500	500	500	500	500	500	500	500
Grader/Maintainer	580	580	580	580	580	580	580	580	580	580	580	580	580
Landfill Tipper	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400
Catch Basin Cleaner	6,100	6,100	6,100	6,100	6,100	6,100	6,100	6,100	6,100	6,100	6,100	6,100	6,100
Hydraulic Concrete Breaker	200	200	200	200	200	200	200	200	200	200	200	200	200
Concrete Mixer	150	150	150	150	150	150	150	150	150	150	150	150	150
Air Compressor	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300
Other 1	280	280	280	280	280	280	280	280	280	280	280	280	280
Other 2	200	200	200	200	200	200	200	200	200	200	200	200	200
Other 3	175	175	175	175	175	175	175	175	175	175	175	175	175
Other 4	130	130	130	130	130	130	130	130	130	130	130	130	130
Other 5	100	100	100	100	100	100	100	100	100	100	100	100	100

4. The Brake Horsepower for Each Equipment Type

	Gasoline	Diesel	Diesel HEV	B20	B100	E85	CNG	LNG	LFG	LPG	Electricity	G.H2	L.H2
Forklift	35	70	56	70	70	35	84	84	84	84	23	42	42
Skid Loader	35	73	58	73	73	35	88	88	88	88	24	44	44
Front-end Loader	87	174	139	174	174	87	209	209	209	209	58	104	104
Crane	50	100	80	100	100	50	120	120	120	120	33	60	60
Backhoe/Loader	58	115	92	115	115	58	138	138	138	138	38	69	69
Excavator	83	165	132	165	165	83	198	198	198	198	55	99	99
Bulldozer	150	300	240	300	300	150	360	360	360	360	100	180	180
Asphalt Paver	28	56	45	56	56	28	67	67	67	67	19	34	34
Asphalt Roller	25	50	40	50	50	25	60	60	60	60	17	30	30
Compactor	263	525	420	525	525	263	630	630	630	630	175	315	315
Woodchipper/Spreader	75	150	120	150	150	75	180	180	180	180	50	90	90
Grader/Maintainer	63	125	100	125	125	63	150	150	150	150	42	75	75
Landfill Tipper	50	100	80	100	100	50	120	120	120	120	33	60	60
Catch Basin Cleaner	115	230	184	230	230	115	276	276	276	276	77	138	138
Hydraulic Concrete Breaker	50	100	80	100	100	50	120	120	120	120	33	60	60
Concrete Mixer	50	50	40	50	50	50	60	60	60	60	17	30	30
Air Compressor	15	30	24	30	30	15	36	36	36	36	10	18	18
Other 1	18	35	28	35	35	18	42	42	42	42	12	21	21
Other 2	25	50	40	50	50	25	60	60	60	60	17	30	30
Other 3	50	100	80	100	100	50	120	120	120	120	33	60	60
Other 4	75	150	120	150	150	75	180	180	180	180	50	90	90
Other 5	125	250	200	250	250	125	300	300	300	300	83	150	150

Option 2 is the same as the user will skip to Table 5 and directly enter the fuel use of the off-road equipment.

Off-Road Fleet sheet - Table 5

5. The annual total fuel use by fleet vehicle (gallons, cubic feet, or kilowatt-hours)

	Gasoline (gallons)	Diesel (gallons)	Diesel HEV (gallons)	B20 (gallons)	B100 (gallons)	E85 (gallons)	CNG (cubic feet)	LNG (gallons)	LFG (cubic feet)	LPG (gallons)	Electricity (kilowatt- hours)	G.H2 (cubic feet)	L.H2 (gallons)
Forklift	0	0	0	0	0	0	0	0	0	0	0	0	0
Skid Loader	0	0	0	0	0	0	0	0	0	0	0	0	0
Front-end Loader	0	0	0	0	0	0	0	0	0	0	0	0	0
Crane	0	0	0	0	0	0	0	0	0	0	0	0	0
Backhoe/Loader	0	0	0	0	0	0	0	0	0	0	0	0	0
Excavator	0	0	0	0	0	0	0	0	0	0	0	0	0
Bulldozer	0	0	0	0	0	0	0	0	0	0	0	0	0
Asphalt Paver	0	0	0	0	0	0	0	0	0	0	0	0	0
Asphalt Roller	0	0	0	0	0	0	0	0	0	0	0	0	0
Compactor	0	0	0	0	0	0	0	0	0	0	0	0	0
Woodchipper/Spreader	0	0	0	0	0	0	0	0	0	0	0	0	0
Grader/Maintainer	0	0	0	0	0	0	0	0	0	0	0	0	0
Landfill Tipper	0	0	0	0	0	0	0	0	0	0	0	0	0
Catch Basin Cleaner	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydraulic Concrete Breaker	0	0	0	0	0	0	0	0	0	0	0	0	0
Concrete Mixer	0	0	0	0	0	0	0	0	0	0	0	0	0
Air Compressor	0	0	0	0	0	0	0	0	0	0	0	0	0
Other 1	0	0	0	0	0	0	0	0	0	0	0	0	0
Other 2	0	0	0	0	0	0	0	0	0	0	0	0	0
Other 3	0	0	0	0	0	0	0	0	0	0	0	0	0
Other 4	0	0	0	0	0	0	0	0	0	0	0	0	0
Other 5	0	0	0	0	0	0	0	0	0	0	0	0	0
Gasoline Gallon Equivalent Total	0	0	0	0	0	0	0	0	0	0	297	0	0

The fuel production assumptions are independent of those chosen in the On-Road Fleet sheet, so users must change them on the Off-Road Fleet sheet to do the intended simulation for the equipment. In addition, a user who wants to enter a custom electricity generation mix will need to go to the Table 6 of the Specs sheet for the off-road fleet mix (see Specs sheet description below). An important note is that there are separate electricity tables in the Specs sheet for the on-road fleet (Table 4) and the off-road fleet (Table 6).

Off-Road Fleet sheet - Table 6

6. Fuel Production Assumptions

Ethanol Feedstock Source	1	1 - Corn 2 - Switchgrass
CNG Feedstock Source	1	1 - North American NG 2 - Non-North American NG
LNG Feedstock Source	1	1 - North American NG 2 - Non-North American NG
LPG Feedstock Source	NG 60%	Petroleum 40%
Source of Electricity for Off-Road Electric Equipment and H2 Electrolysis	1	1 - Average U.S. Mix 2 - Average Northeast Mix 3 - Average California Mix 4 - User Defined (go to 'Specs' sheet)
G.H2 Production Process	1	1 - Refueling Station SMR (On-site) 2 - Central Plant SMR (Off-site) 3 - Refueling Station Electrolysis (On-site)
L.H2 Production Process	1	1 - Refueling Station SMR (On-site) 2 - Central Plant SMR (Off-site) 3 - Refueling Station Electrolysis (On-site)

The results are in the same format as those on the On-Road Fleet sheet.

Off-Road Fleet sheet - Table 7-8

7. Results of Off-Road Fleet's Petroleum Usage (barrels)

	Gasoline	Diesel		B20	B100	E85	CNG	LNG	LFG	LPG	Electricity	G.H2	L.H2	Vehicle Total
		Diesel	HEV											
Forklift	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Skid Loader	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Front-end Loader	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Backhoe/Loader	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Excavator	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bulldozer	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Asphalt Paver	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Asphalt Roller	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Compactor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Woodchipper/Spreader	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Grader/Maintainer	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Landfill Tipper	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Catch Basin Cleaner	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hydraulic Concrete Breaker	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Concrete Mixer	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Air Compressor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Off-Road Fleet Total 0.0 barrels of oil

8. Results of Off-Road Fleet's Greenhouse Gas Emissions (short tons CO2-equivalent)

	Gasoline	Diesel		B20	B100	E85	CNG	LNG	LFG	LPG	Electricity	G.H2	L.H2	Vehicle Total
		Diesel	HEV											
Forklift	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Skid Loader	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Front-end Loader	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Backhoe/Loader	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Excavator	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bulldozer	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Asphalt Paver	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Asphalt Roller	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Compactor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Woodchipper/Spreader	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Grader/Maintainer	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Landfill Tipper	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Catch Basin Cleaner	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hydraulic Concrete Breaker	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Concrete Mixer	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Air Compressor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Off-Road Fleet Total 0.0 short tons of GHG emissions

Specs sheet

This sheet contains the software copyright notice and the background data/calculations for GREET Fleet. The information for each fuel type in the calculator is taken from the GREET model and put into the corresponding tables. In addition, as previously mentioned, the user can input custom electricity mixes on this sheet, in Table 4 for the on-road fleet and Table 6 for the off-road fleet.

Specs sheet - Table 4

4. Electric Generation Mix: Data Table for On-Road Simulation

	U.S. Mix	NE U.S. Mix	CA Mix	User Mix
	Transportation	Transportation	Transportation	Transportation
Residual oil	1.1%	2.2%	0.0%	1.1%
Natural gas	18.3%	21.7%	36.6%	18.3%
Coal	50.4%	29.9%	13.3%	50.4%
Nuclear power	20.0%	33.9%	20.5%	20.0%
Biomass	0.7%	2.2%	1.3%	0.7%
Others (Wind, Solar, Hydro, etc)	9.5%	10.1%	28.3%	9.5%

Specs sheet - Table 6

6. Electric Generation Mix: Data Table for Off-Road Simulation

	U.S. Mix Transportation	NE U.S. Mix Transportation	CA Mix Transportation	User Mix Transportation
Residual oil	1.1%	2.2%	0.0%	1.1%
Natural gas	18.3%	21.7%	36.6%	18.3%
Coal	50.4%	29.9%	13.3%	50.4%
Nuclear power	20.0%	33.9%	20.5%	20.0%
Biomass	0.7%	2.2%	1.3%	0.7%
Others (Wind, Solar, Hydro, etc)	9.5%	10.1%	28.3%	9.5%

Contact Information For GREET Fleet

Andrew Burnham

greet@anl.gov